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EXAMINER

GREEN, PHILLIP

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

DETAILED ACTION

Information Disclosure Statement

1. The information disclosure statement filed March 28, 2008 fails to comply with the provisions of 37 CFR 1.97, 1.98 and MPEP § 609 because:

Mizuno, B., "Ultra Shallow Junction for sub 50NM CMOS.." did not have a translation.

It has been placed in the application file, but the information referred to therein has not been considered as to the merits. Applicant is advised that the date of any re-submission of any item of information contained in this information disclosure statement or the submission of any missing element(s) will be the date of submission for purposes of determining compliance with the requirements based on the time of filing the statement, including all certification requirements for statements under 37 CFR 1.97(e). See MPEP § 609.05(a).

Claim Objections

2. Claim 37 is objected to because of the following informalities: Claim 37, line 2 recites the following limitations "wavelength" and "light absorption ratio," this is unclear. The examiner suggests using a particle. Appropriate correction is required. ..

Claim 43 is objected to because of the following informalities: Claim 43, line 2-3 recites the following limitations "wavelength" and "absorption ratio," this is unclear. The examiner suggests using a particle. Appropriate correction is required.

Claim 43 is objected to because of the following informalities: Line 1 recites the limitation “light absorption ratio” this is unclear due to insufficient antecedent basis. Appropriate correction is required.

Claim 44 is objected to because of the following informalities: Line 1 recites the limitation “light absorption ratio” this is unclear due to insufficient antecedent basis. Appropriate correction is required.

Claims 33-48 is objected to because of the following informalities: Line 1 recites the limitation “the method of making a junction,” this is unclear due to insufficient antecedent basis. Appropriate correction is required.

Double Patenting

3. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

4. Claims 31-34, 36, 37, and 39-41 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 23-

35 of copending Application No. 11153572. Although the conflicting claims are not identical, they are not patentably distinct from each other because 11153572 requires a method for introducing impurities, comprising: a first step for irradiating a plasma containing He to a surface of a solid substrate so as to form an amorphous layer at the surface of the solid substrate; a second step for introducing impurities into the surface of the solid substrate at which the amorphous layer has been formed, and an annealing step after the second step, wherein the annealing step is a step for activating the impurities.

The copending claim application 11153572 does not explicitly claims the method of controlling the ranges to manufacture the device however it does not teach the ranges of the instant application.

In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed Cir. 1990) (The prior art taught carbon monoxide concentrations of “about 1-5%” while the claim was limited to “more than 5%.” The court held that “about 1-5%” allowed for concentrations slightly above 5% thus the ranges overlapped.); In re Geisler, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997) (Claim reciting thickness of a protective layer as falling within a range of “50 to 100 Angstroms” considered prima facie obvious in view of prior art reference teaching that “for suitable protection, the thickness of the protective layer should be not less than about 10 nm [i.e., 100 Angstroms].” The court stated that “by stating that suitable protection’ is provided if the

Art Unit: 2823

protective layer is about' 100 Angstroms thick, [the prior art reference] directly teaches the use of a thickness within [applicant's] claimed range."). Similarly, a prima facie case of obviousness exists where the claimed ranges and prior art ranges do not overlap but are close enough that one skilled in the art would have expected them to have the same properties. *Titanium Metals Corp. of America v. Banner*, 778 F.2d 775, 227 USPQ 773 (Fed. Cir. 1985) (Court held as proper a rejection of a claim directed to an alloy of "having 0.8% nickel, 0.3% molybdenum, up to 0.1% iron, balance titanium" as obvious over a reference disclosing alloys of 0.75% nickel, 0.25% molybdenum, balance titanium and 0.94% nickel, 0.31% molybdenum, balance titanium.).

A. Optimization Within Prior Art Conditions or Through Routine Experimentation

Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical. "[W]here the general conditions of a claim are disclosed in the prior art, it is not inventive to discover the optimum or workable ranges by routine experimentation." *In re Aller*, 220 F.2d 454, 456, 105 USPQ 233, 235 (CCPA 1955) (Claimed process which was performed at a temperature between 40°C and 80°C and an acid concentration between 25% and 70% was held to be prima facie obvious over a reference process which differed from the claims only in that the reference process was performed at a temperature of 100°C and an acid concentration of 10%.); see also *Peterson*, 315 F.3d at 1330, 65 USPQ2d at 1382 ("The normal desire of scientists or artisans to improve upon what is already generally known provides the motivation to determine where in a disclosed set of percentage ranges is the optimum

combination of percentages.”); In re Hoeschele, 406 F.2d 1403, 160 USPQ 809 (CCPA 1969) (Claimed elastomeric polyurethanes which fell within the broad scope of the references were held to be unpatentable thereover because, among other reasons, there was no evidence of the criticality of the claimed ranges of molecular weight or molar proportions.). For more recent cases applying this principle, see Merck & Co. Inc. v. Biocraft Laboratories Inc., 874 F.2d 804, 10 USPQ2d 1843 (Fed. Cir.), cert. denied, 493 U.S. 975 (1989); In re Kulling, 897 F.2d 1147, 14 USPQ2d 1056 (Fed. Cir. 1990); and In re Geisler, 116 F.3d 1465, 43 USPQ2d 1362 (Fed. Cir. 1997).

B. Only Result-Effective Variables Can Be Optimized

A particular parameter must first be recognized as a result-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation. In re Antonie, 559 F.2d 618, 195 USPQ 6 (CCPA 1977) (The claimed wastewater treatment device had a tank volume to contractor area of 0.12 gal./sq. ft. The prior art did not recognize that treatment capacity is a function of the tank volume to contractor ratio, and therefore the parameter optimized was not recognized in the art to be a result-effective variable.). See also In re Boesch, 617 F.2d 272, 205 USPQ 215 (CCPA 1980) (prior art suggested proportional balancing to achieve desired results in the formation of an alloy).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

6. Claims 31-34, 38, 42, and 45-48 rejected under 35 U.S.C. 102(e) as being anticipated by Thibaut (US 20060264051 A1).

Re claim 31, Thibaut discloses a method for making a device, comprising the steps of:

irradiating a plasma containing He to a substrate **(S22)**;

introducing impurities into the substrate **(S31)**; and

irradiating an electromagnetic wave **(S26)** so as to electrically activate the impurities. irradiating an electromagnetic wave so as to electrically activate the impurities, wherein in the step of irradiating the plasma, an amorphous layer is formed by He-plasma. (Note: Paragraph 0126)

Re claim 32, Thibaut discloses a method for making a device, comprising the steps of:

irradiating a plasma containing He and a plasma containing particles to be served as impurities to a substrate, so as to introduce the impurities into the substrate; and **(S22)**

irradiating an electromagnetic wave so as to electrically activate the impurities wherein in the step of irradiating the plasma, an amorphous layer is formed by He-plasma. **(S26)** (Note: Paragraph 0126)

Re claim 33, as applied to claim 31 or 32 in the paragraph above, Thibaut discloses a method for making a junction, wherein the plasma is primarily comprised of He. (Note: Paragraph 0064)

Re claim 34, as applied to claim 31 or 32 in the paragraph above, Thibaut discloses a method for making a junction, wherein the plasma is comprised of only He. (Note: Paragraph 0064)

Re claim 38, as applied to claim 31 or 32 in the paragraph above, Thibaut discloses a method for making a junction, including, forming an impurity of boron in a amorphous layer through plasma doping. Thibaut uses a silicon substrate, one of semiconductor substrates is taken as an example of an object to be processed; however, other solid substrates such as compound semiconductor substrates, strain silicon substrates, and SOI substrates also can work as objects to be processed. (Note: Paragraph 0050-0052)

Re claim 45, as applied to claim 31 or 32 in the paragraph above, Thibaut discloses a method for making a junction, wherein the step of introducing the impurities is a step of introducing the impurities by plasma doping. (Note: Figure 2; S23a-b).

Re claim 42 and 46-48, as applied to claim 31 or 32 in the paragraph above, Thibaut discloses a method of forming an impurity of boron in a amorphous layer through plasma doping. Thibaut uses a silicon substrate as a semiconductor substrates;

however, other solid substrates such as compound semiconductor substrates, strain silicon substrates, and SOI substrates also can work as objects to be processed. (Note: Paragraph 0050-0052)

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 36-37, 39-40 and 43-44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Thibaut (US 20060264051 A1).

Re claim 36-37 and 43-44, Thibaut discloses a method of forming an impurity-introduced amorphous layer through plasma doping. Thibaut discloses a overlapping range with the following conditions: wavelength of 530 nm with a light absorption coefficient larger than $9.5 \times 10^4 \text{ cm}^{-1}$ with a layer around 7 nanometer. (Note: Figure 18 and 19 and Paragraph 0140-0148).

In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. In re Wertheim, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In re Woodruff, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (The prior art taught carbon monoxide concentrations of “about 1-5%” while the claim was limited to “more than 5%.” The court held that “about 1-5%” allowed for concentrations slightly above 5% thus the ranges overlapped.); In re Geisler, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997) (Claim reciting thickness

of a protective layer as falling within a range of "50 to 100 Angstroms" considered prima facie obvious in view of prior art reference teaching that "for suitable protection, the thickness of the protective layer should be not less than about 10 nm [i.e., 100 Angstroms]." The court stated that "by stating that suitable protection' is provided if the protective layer is about' 100 Angstroms thick, [the prior art reference] directly teaches the use of a thickness within [applicant's] claimed range."). "[A] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness." In re Peterson, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). >See also In re Harris, 409 F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005)(claimed alloy held obvious over prior art alloy that taught ranges of weight percentages overlapping, and in most instances completely encompassing, claimed ranges; furthermore, narrower ranges taught by reference overlapped all but one range in claimed invention).< However, if the reference's disclosed range is so broad as to encompass a very large number of possible distinct compositions, this might present a situation analogous to the obviousness of a species when the prior art broadly discloses a genus. Id. See also In re Baird, 16 F.3d 380, 29 USPQ2d 1550 (Fed. Cir. 1994); In re Jones, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); MPEP § 2144.08.

Re claim 39-40, Thibaut discloses a method for making a junction as applied to as applied to claim 31 or 32 in the paragraph above. Thibaut discloses a method of forming an impurity of boron in a amorphous layer through plasma doping. Thibaut uses electromagnetic wave of 530 nm. (Note: Paragraph 0145).

In the case where the claimed ranges “overlap or lie inside ranges disclosed by the prior art” a prima facie case of obviousness exists. In *re Wertheim*, 541 F.2d 257, 191 USPQ 90 (CCPA 1976); In *re Woodruff*, 919 F.2d 1575, 16 USPQ2d 1934 (Fed. Cir. 1990) (The prior art taught carbon monoxide concentrations of “about 1-5%” while the claim was limited to “more than 5%.” The court held that “about 1-5%” allowed for concentrations slightly above 5% thus the ranges overlapped.); In *re Geisler*, 116 F.3d 1465, 1469-71, 43 USPQ2d 1362, 1365-66 (Fed. Cir. 1997) (Claim reciting thickness of a protective layer as falling within a range of “50 to 100 Angstroms” considered prima facie obvious in view of prior art reference teaching that “for suitable protection, the thickness of the protective layer should be not less than about 10 nm [i.e., 100 Angstroms].” The court stated that “by stating that suitable protection’ is provided if the protective layer is about’ 100 Angstroms thick, [the prior art reference] directly teaches the use of a thickness within [applicant’s] claimed range.”). “[A] prior art reference that discloses a range encompassing a somewhat narrower claimed range is sufficient to establish a prima facie case of obviousness.” In *re Peterson*, 315 F.3d 1325, 1330, 65 USPQ2d 1379, 1382-83 (Fed. Cir. 2003). >See also In *re Harris*, 409 F.3d 1339, 74 USPQ2d 1951 (Fed. Cir. 2005)(claimed alloy held obvious over prior art alloy that taught ranges of weight percentages overlapping, and in most instances completely encompassing, claimed ranges; furthermore, narrower ranges taught by reference overlapped all but one range in claimed invention).< However, if the reference’s disclosed range is so broad as to encompass a very large number of possible distinct compositions, this might present a situation analogous to the obviousness of a species

Art Unit: 2823

when the prior art broadly discloses a genus. *Id.* See also *In re Baird*, 16 F.3d 380, 29 USPQ2d 1550 (Fed. Cir. 1994); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992); MPEP § 2144.08.

9. Claim 41 is rejected under 35 U.S.C. 103(a) as being unpatentable over Sasaki et al. "B₂H₆ Plasma Doping with In-situ He Pre-amorphization", 2004 Symposium on VLSI Technology Digest of Technical Papers, pp. 180-181 and Ito et al "Improvement of Threshold Voltage Roll-off by Ultra-shallow Junction Formed by Flash Lamp Annealing.").

Re claim 41, Sasaki discloses the elements of 31 including a method for making a device, comprising the steps of:

irradiating a plasma containing He to a substrate **(Abstract, line3);**

introducing impurities into the substrate **(Abstract, line 4);** and

irradiating an electromagnetic wave so as to electrically activate the impurities.

irradiating an electromagnetic wave so as to electrically activate the impurities, wherein in the step of irradiating the plasma, an amorphous layer is formed by He-plasma.

(Abstract, line 9)

Re claim 41, Sasaki discloses the elements of 32 including a method for making a device, comprising the steps of:

irradiating a plasma containing He and a plasma containing particles to be served as impurities to a substrate, so as to introduce the impurities into the substrate; and **(Abstract, lines 3-4)**

irradiating an electromagnetic wave so as to electrically activate the impurities wherein in the step of irradiating the plasma, an amorphous layer is formed by He-plasma. **(Abstract, line 9)** (Note: Paragraph 0126)

Sasaki teaches the use of flash annealing, but not with an xenon flash lamp as claimed.

Ito teaches the use of a xenon flash lamp as the means of flash annealing in the formation of ultra-shallow junction.

It would have been obvious to combine the teachings of Sasaki and Ito to enable the formation of ultra-shallow junction to be formed according to the teachings of Sasaki. One of ordinary skill in the art would have had a reasonable expectation of success that the flash lamp annealing of Ito would have been suitable in performing the annealing step of Sasaki in view of the disclosure of Ito that flash lamp annealing is suitable in forming a shallow junction in a similar device. Also, one of ordinary skill in the art would have been led to the recited intensity to achieve desired device performance on the finished device.

Response to Arguments

10. Applicant's arguments with respect to claims 31-48 have been considered but are moot in view of the new ground(s) of rejection.

Claim 35 has been cancelled, so it has been withdrawn from consideration.

Conclusion

11. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Correspondence

12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to PHILLIP GREEN whose telephone number is (571)272-7024. The examiner can normally be reached on Monday - Thursday; 9 a.m - 7 p.m..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew S. Smith can be reached on (571)272-1907. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2823

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/George Fourson/
Primary Examiner, Art Unit 2823

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Examiner, Art Unit 2823
06/26/2008